Honeywell PMP

Content

- HW level1 process
- Challenges…Peter Sandborn
- Example program…new military design
- ?

PMP Objectives

- Part Selection
- Part Qualification
- Continuous Part Quality
- Compatibility with product manufacturing processes
- Data Collection and Analysis
- Obsolescence Management
- Configuration Management
- Part Risk Management
- Common Honeywell Processes
- Sub-contract Flow-down of Requirements

Part Selection

- **Objective**
- Parts are applied to optimize Honeywell equipment with respect to performance, environmental requirements (including the use of parts outside the manufacturers specifications) cost, size, weight, quality, standardization, and availability.

- **Requirement**
- Parts ***shall*** be selected according to the process described in this section, the Level 2 document referenced in Appendix A, and illustrated in the flow chart of Figure C-2. Honeywell will select parts that satisfy the equipment design requirements for functionality, reliability, manufacturability, continuous improvement, and quality assurance.

Part Qualification

- **Objective**
- Qualification ensures parts of acceptable quality, reliability, and performance.

- **Requirement**
- Part management requires the use of qualified parts from qualified manufacturers. All parts used in equipment produced by Honeywell ***shall*** be qualified by using relevant, credible data, according to the process described in this section, the Level 2 document referenced in Appendix A.

Continuous Part Quality

- **Objective**
- Ongoing part quality, reliability, and performance are ensured.

- **Requirement**
- All parts used in equipment produced by Honeywell ***shall*** be monitored for quality assurance to the process described in this section, the Level 2 document referenced in Appendix A, and illustrated in the flow chart of Figure C-4.

Compatibility with Manufacturing Processes

- **Objective**
- Part integrity is ensured throughout manufacturing, assembly, repair, rework, testing, shipping, handling, and storage.

- **Requirement**
- Within the following processes, documented elements focus on parts. The five listed processes ***shall*** be considered the minimum for Honeywell assembly operations (including subcontractors):
  - Process control
  - Inspection and testing
  - Corrective and preventive action
  - Handling, storage, and delivery
  - Statistical techniques

Data Collection and Analysis

- **Objective**
- Part quality problems are detected and minimized via collecting and analyzing data.

- **Requirement**
- Part removal data ***shall*** be collected on in-process and field return data, and made available for analysis, root cause identification and corrective action, according to the process described in this section and the Level 2 document referenced in Appendix A. Parts will be retained to allow sufficient opportunity for data and part analysis.

Obsolescence Management

- **Objective**
- The impact of part obsolescence is minimized through documented strategies that ensure producibility and supportability, of equipment.

- **Requirement**
- Part life cycle processes ***shall*** be defined and implemented to address part obsolescence issues on both a proactive and reactive basis, according to processes such as those described in this section and the Level 2 document referenced in Appendix A.

Configuration Management

- **Objective**
- Parts are systematically managed to maintain integrity and traceability through appropriate data collection and reporting.

- **Requirement**
- Each location of Honeywell ***shall*** follow a selection and substitution process, which assures configuration control of parts and parts lists for all equipment. Configuration control processes are contained in process documents unique to each division or location of Honeywell and are referenced in Appendix A. Appropriate documentation showing configuration control shall be maintained for all products.

Risk Management

- **Objective**
- Support product level risk assessment by identifying and addressing part level risks.

- **Requirement**
- The ability, or potential inability, to achieve overall program or part management objectives within defined cost, schedule, and technical constraints ***shall*** be managed using risk management methods outlined in the Level 2 document(s) listed in Appendix A. This includes planning for risk, assessing risk areas, developing risk-handling options, monitoring risks to determine how risks have changed and documenting the overall risk management program.

Common Honeywell Processes

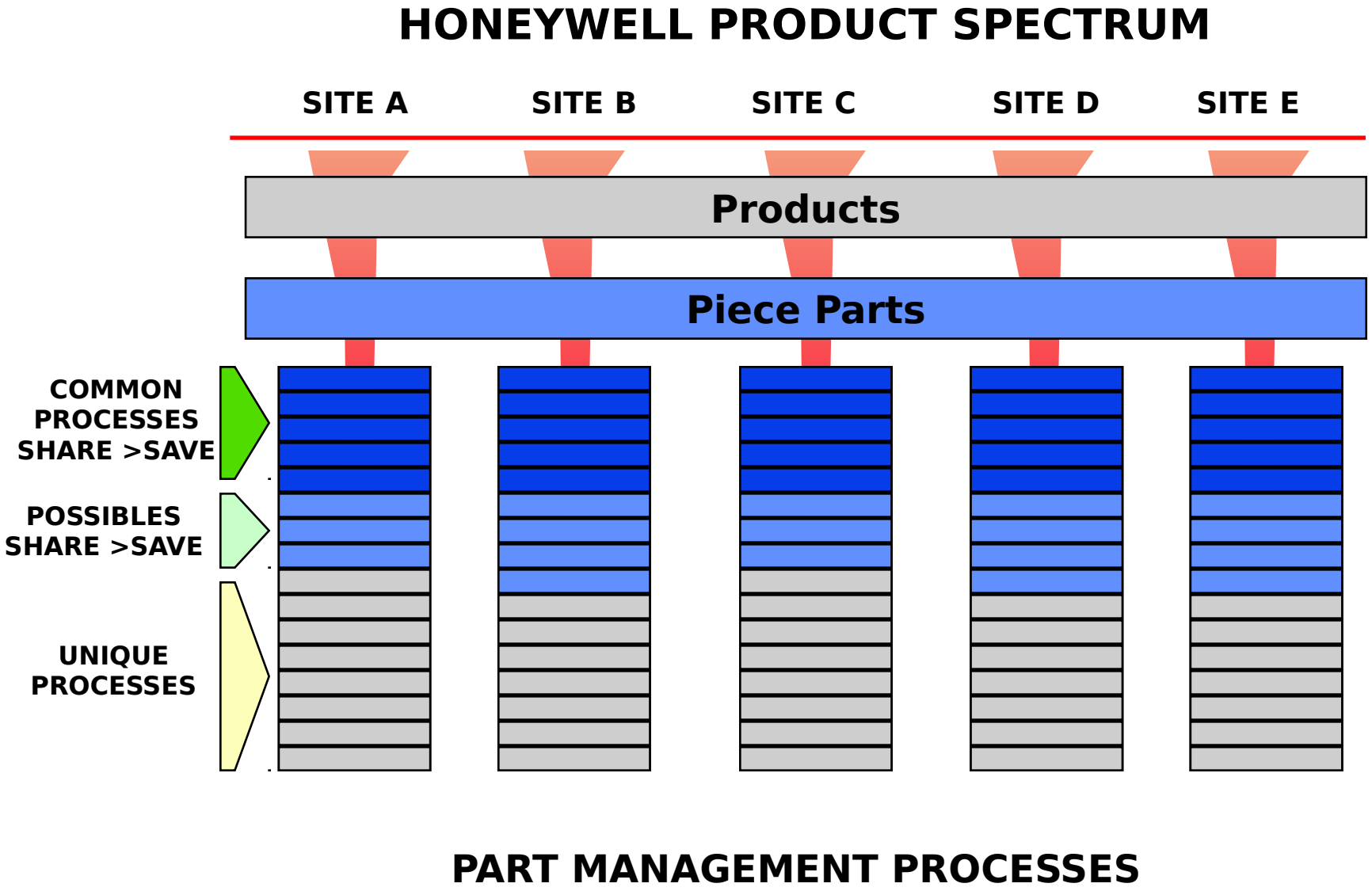
- **Objective**
- Although detailed requirements are fulfilled through internal Honeywell processes that are unique to the location authoring the process, common processes to fulfill part management objectives is a top priority and will continue to improve.

- **Requirement**
- Honeywell sites ***shall*** share processes used to fulfill the requirements of this program, where the benefit is clear to both Honeywell and the customer. Honeywell's goal is to continuously improve best practices and be better able to re-use parts and data in a more efficient way. Visibility to process sharing is contained in the Level 2 documents.

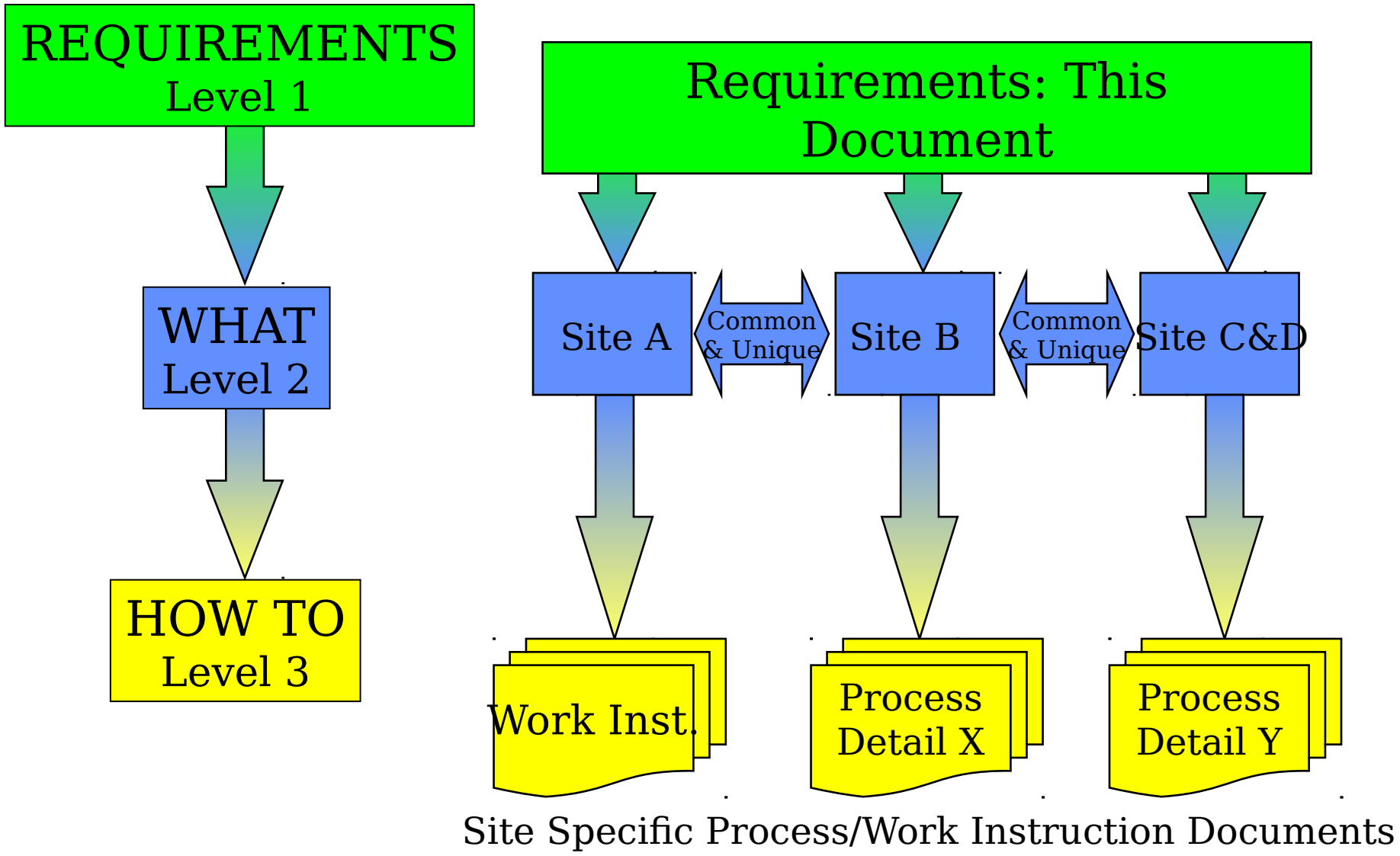
Benefits

- **Reduced part cost**
  - **Fewer suppliers to manage**
  - **Reuse of parts (fewer parts to manage)**
  - **Reuse of part information (qualification, reliability, obsolescence etc. information)**
- **Parts database used company wide**
- **Greater leverage with suppliers**
- **Coordinated technology direction across the company**
- **Lower cost single process for all commercial and military customers**
- **Coordinated pro-active management of obsolescence and its increasing impact**

PMP Process Sharing Across Products/Sites



PMP Multi-Level Structure

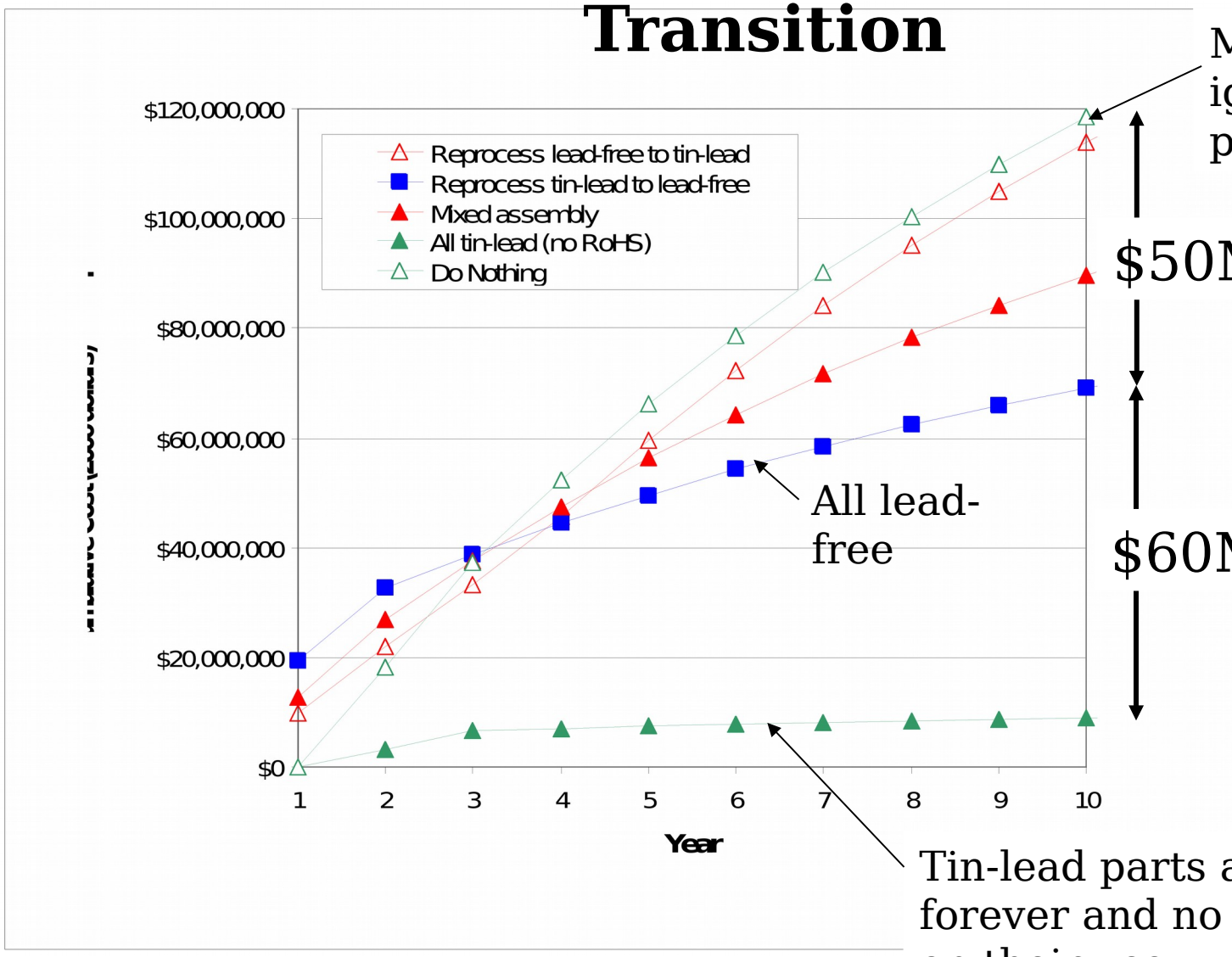


Electronic Systems Cost
Modeling Laboratory

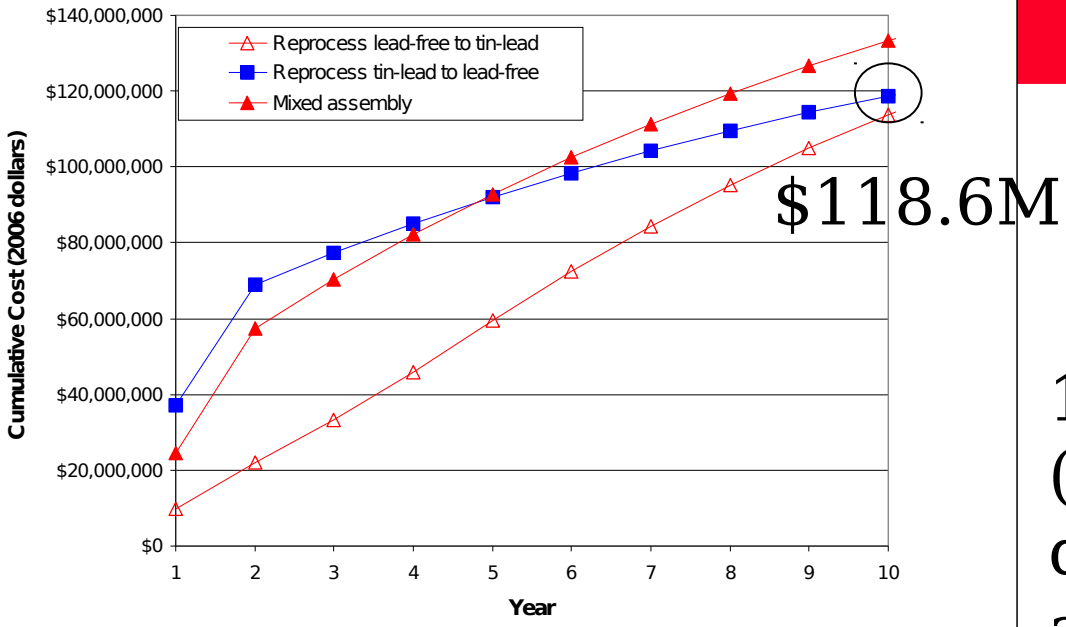
ECMP Challenges
Leadfree Transition

CALCE Electronic Products and Systems Center
Department of Mechanical Engineering
University of Maryland

Cumulative Cost of Lead-Free Part Transition



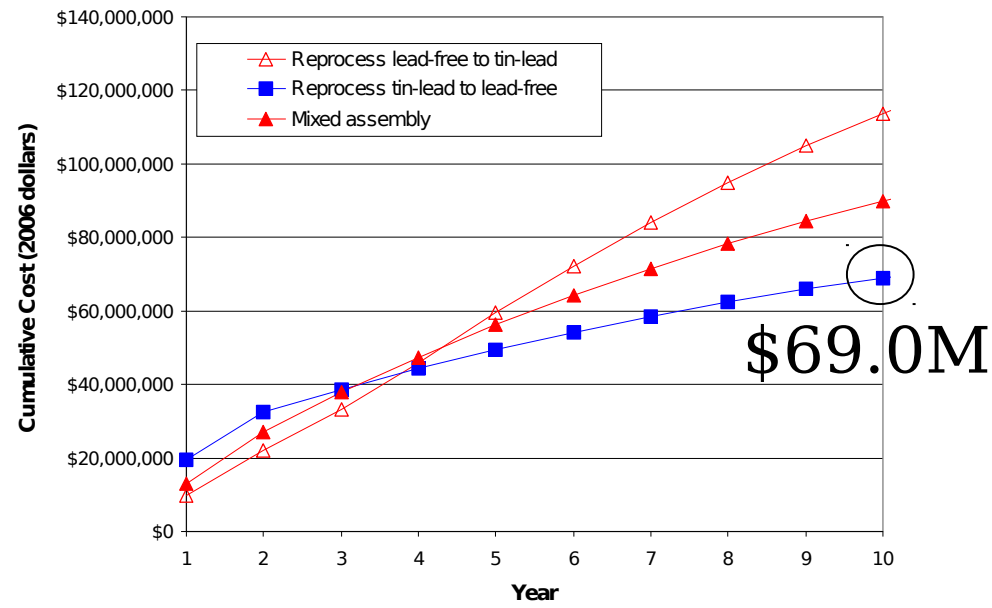
What If Suppliers Get Pulled in Multiple Directions?



$118.6M

10 plans (40% program cost discount for additional plans)

Δ = $50M ten years out

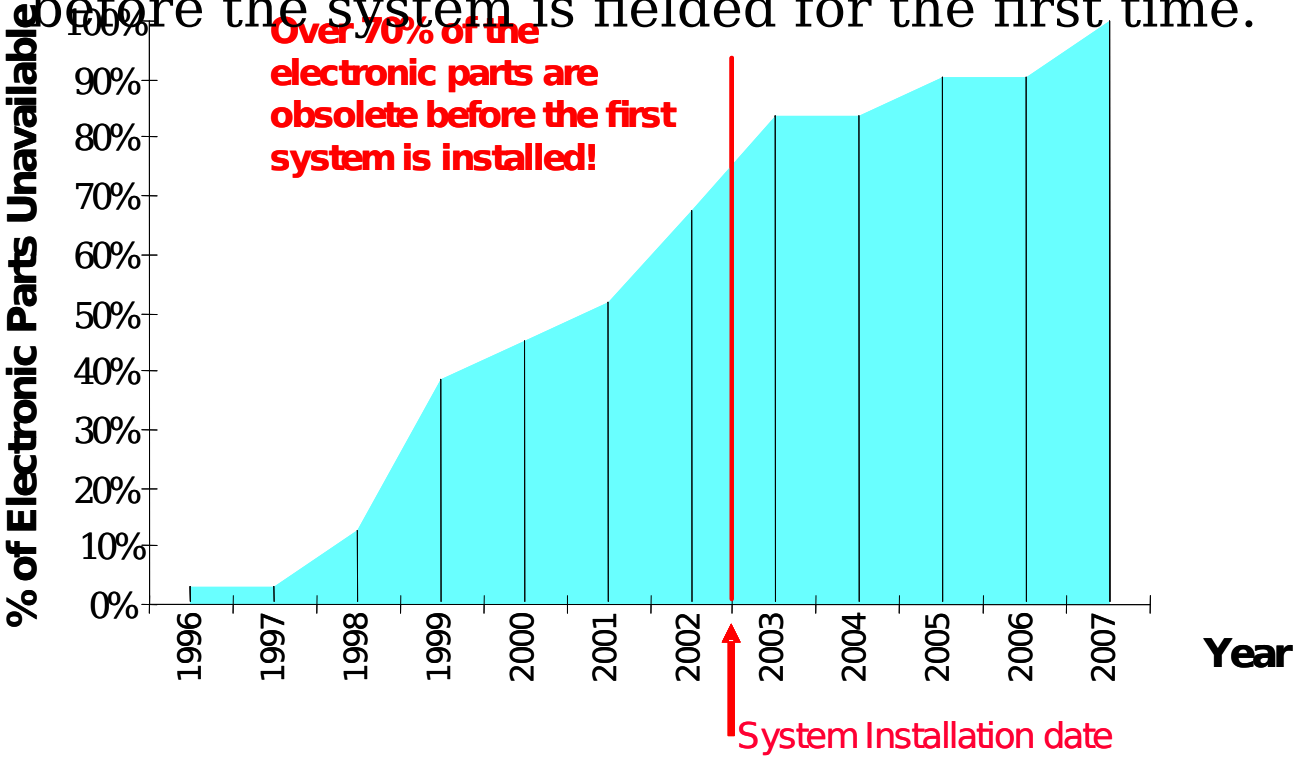


$69.0M

1 plan (result on previous slide)

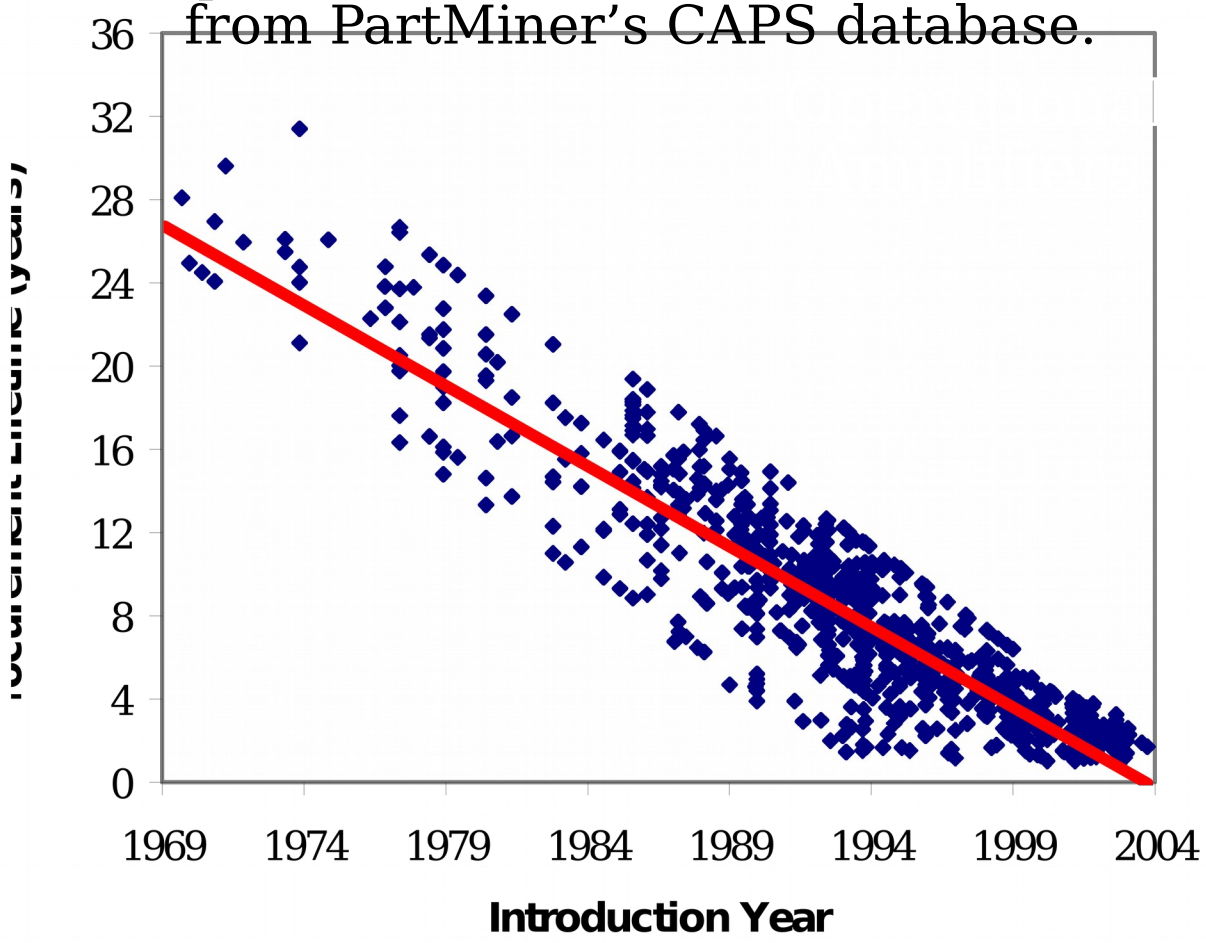
Diminishing Manufacturing Sources and Material Shortages (DMSMS)

Percent of electronic parts that are obsolete (out of production, un-procurable) versus the first 10 years of a surface ship sonar system's life cycle. It is not uncommon for that majority of electronic parts in military and avionics systems to be obsolete before the system is fielded for the first time.



Shrinking Procurement Life

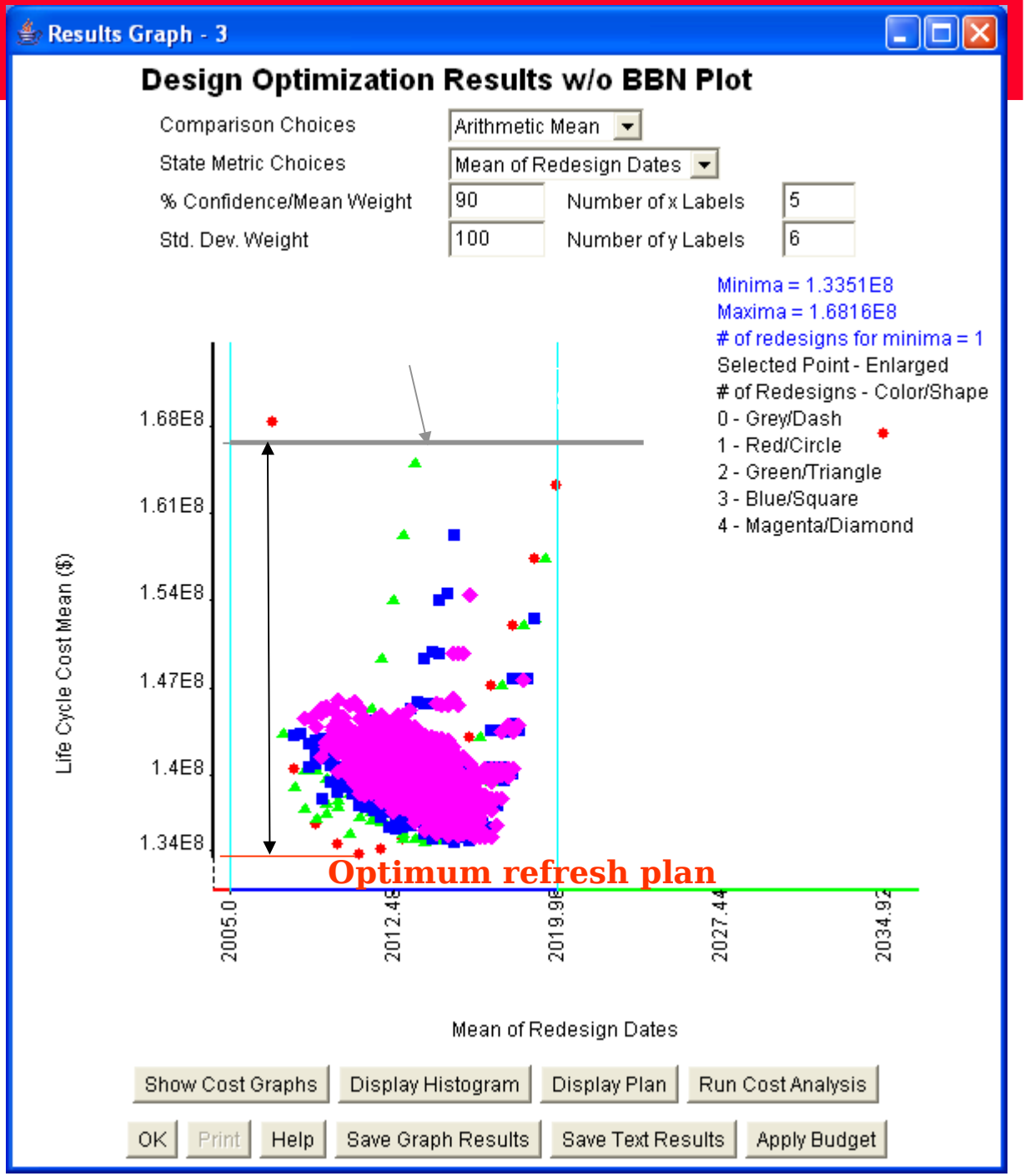
The procurement life is the number of years the part can be procured from its original manufacturer. This graph contains over 2400 data points from 7 manufacturers, which were mined from PartMiner's CAPS database.



Cost Avoidance Through Strategic Obsolescence Management

Cost Avoidance = $33.1M

Motorola GTR8000 RF base station communications system



Motorola Example: Comparison of Management Approaches

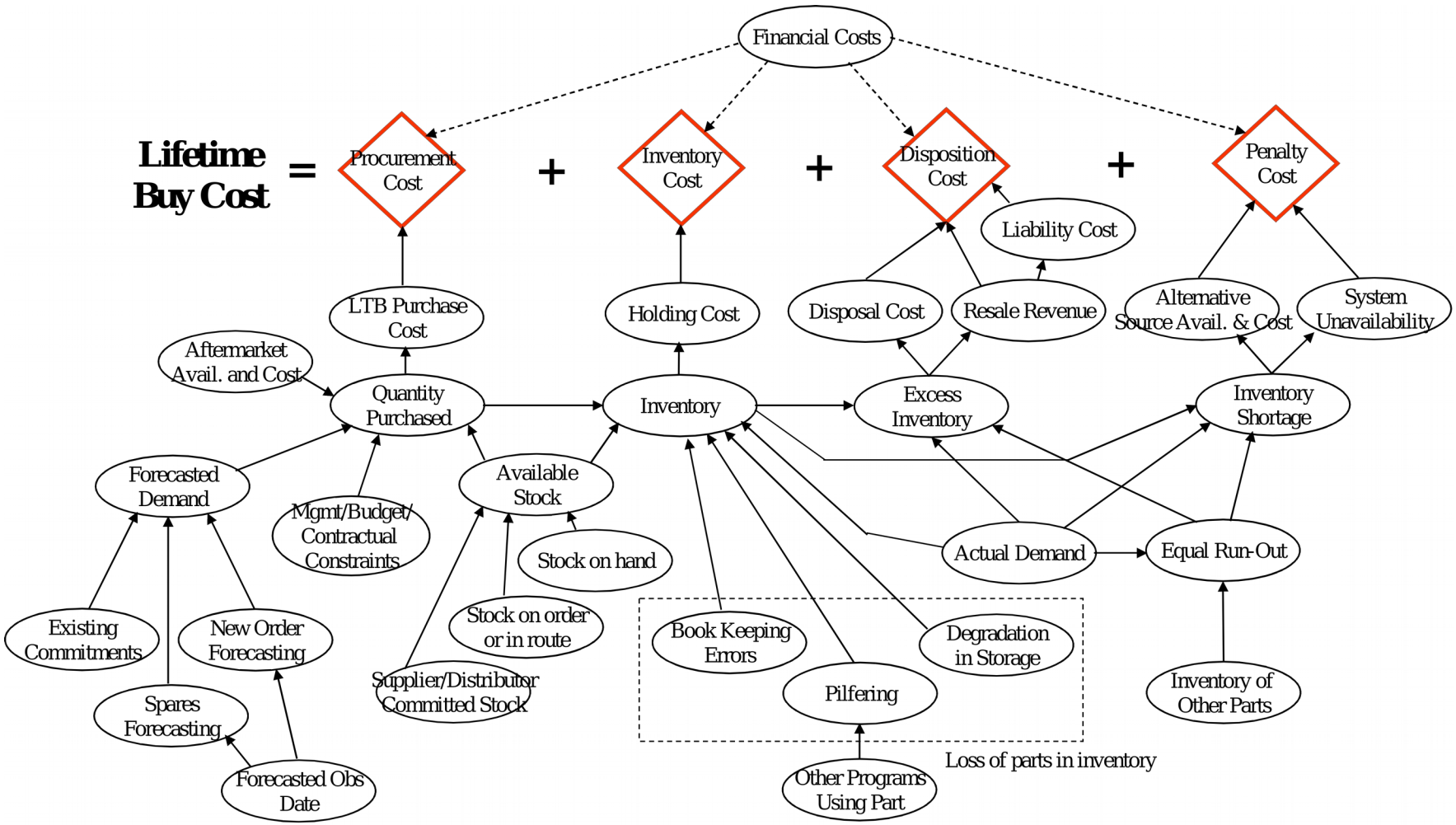
	Perfect world (no part obsolescence events)	No refreshes (Lifetime buy at every obsolescence event)	No lifetime buys (Design refresh at every obsolescence event)	Optimum solution - bridge buys and one refresh in 2011.
Excess Part Procurement*	**0**	**$30.32M**	**0**	**$3.00M**
Material cost of inventory (COI)	**0**	**$12.4M**	**0**	**$0.86M**
NRE and Re-qualification	**0**	**0**	**$23.2M**	**$5.81M**
Obs Mgmt Cost Total	0	$42.7M	$23.2M	$9.67M

Everything is measured relative to this case

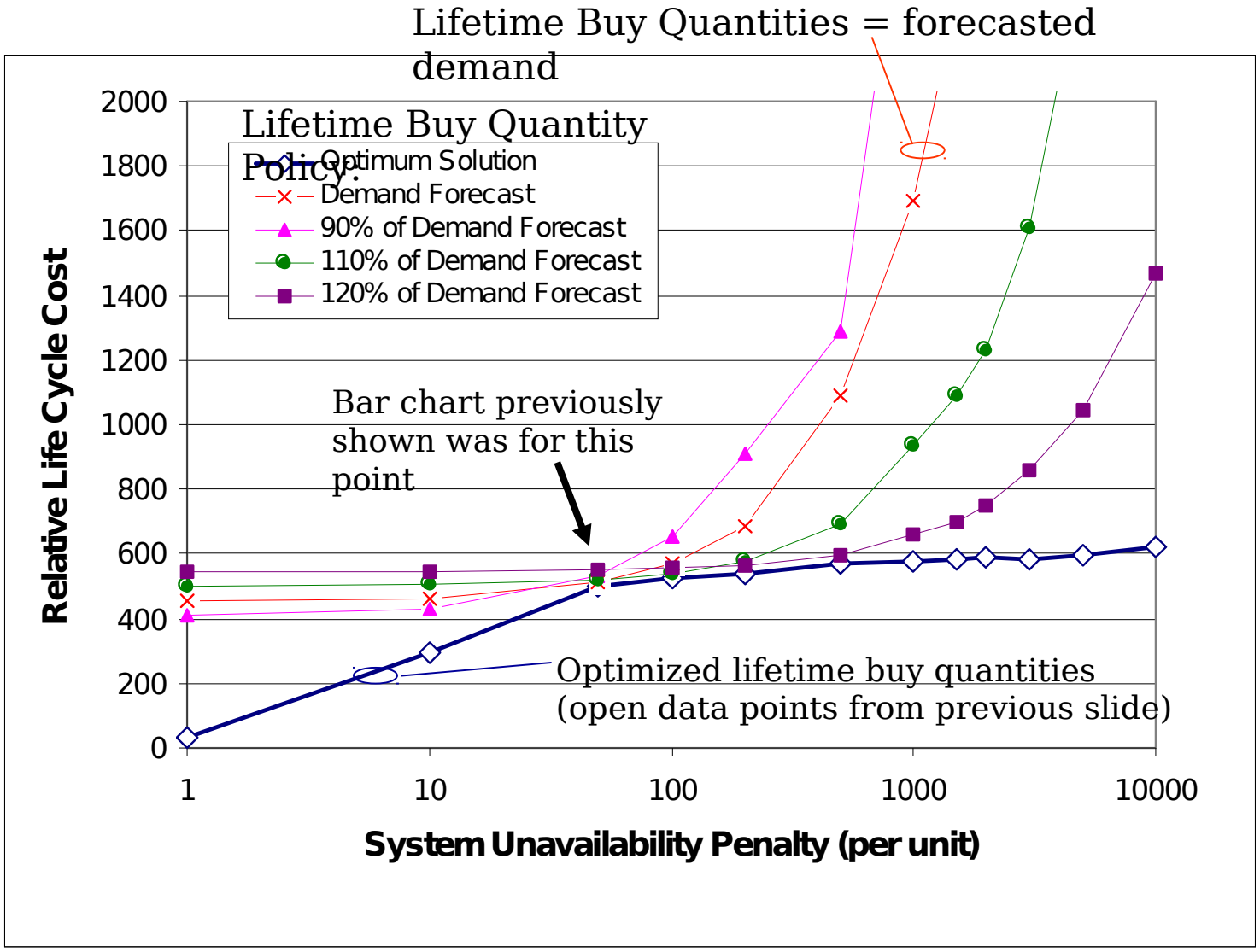
$33.1M

xpense due to lifetime and bridge buys rather than procuring parts “just in time

Lifetime Buy Cost



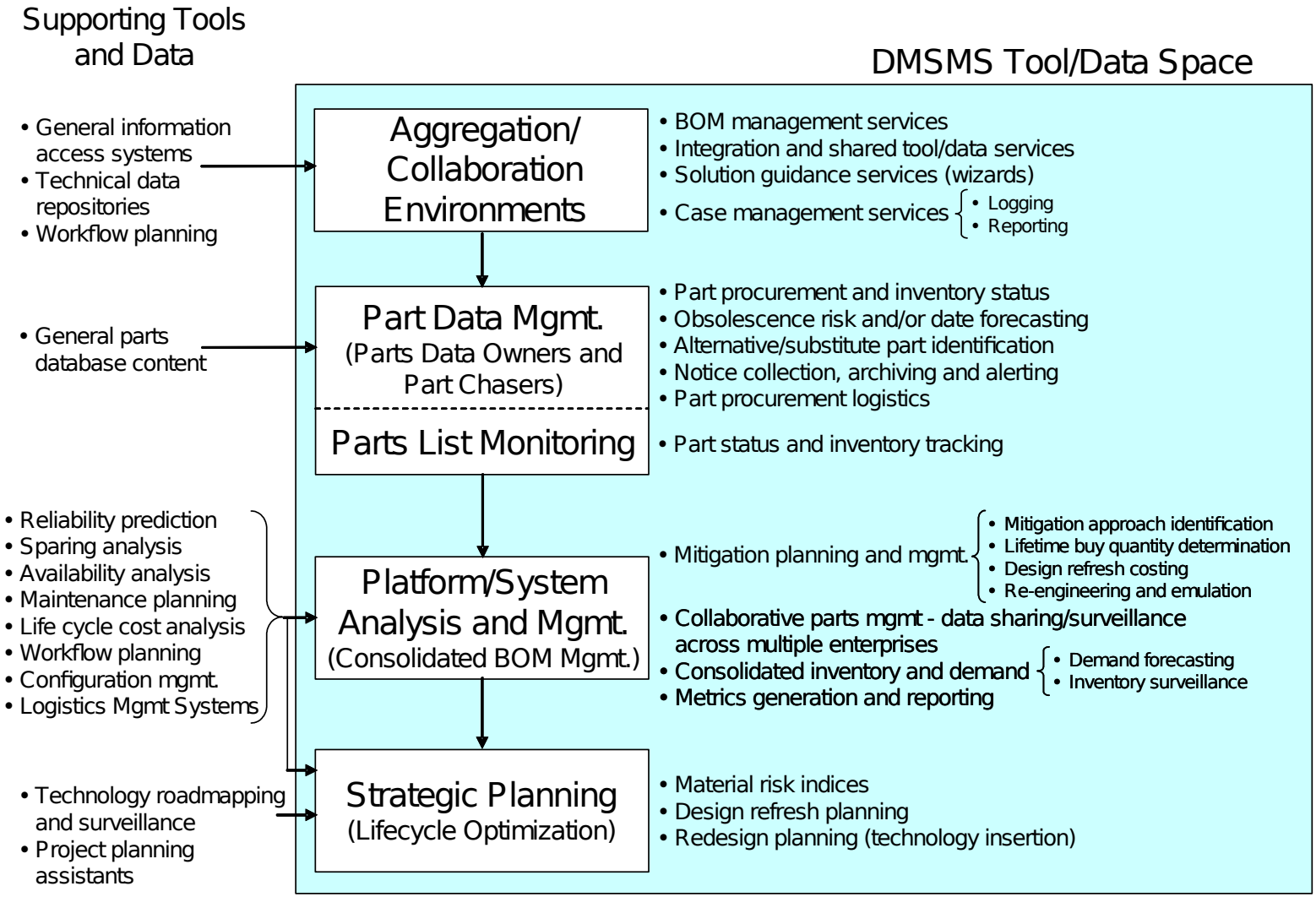
Lifetime Buys: The Cost of Being Wrong



Lifetime buys cost a lot more money than people perceive.

Poor lifetime buy quantity forecasting can be very expensive.

Taxonomy of DMSMS Tools/Data
(DMSMS Working Group, Common Use Tools Committee)

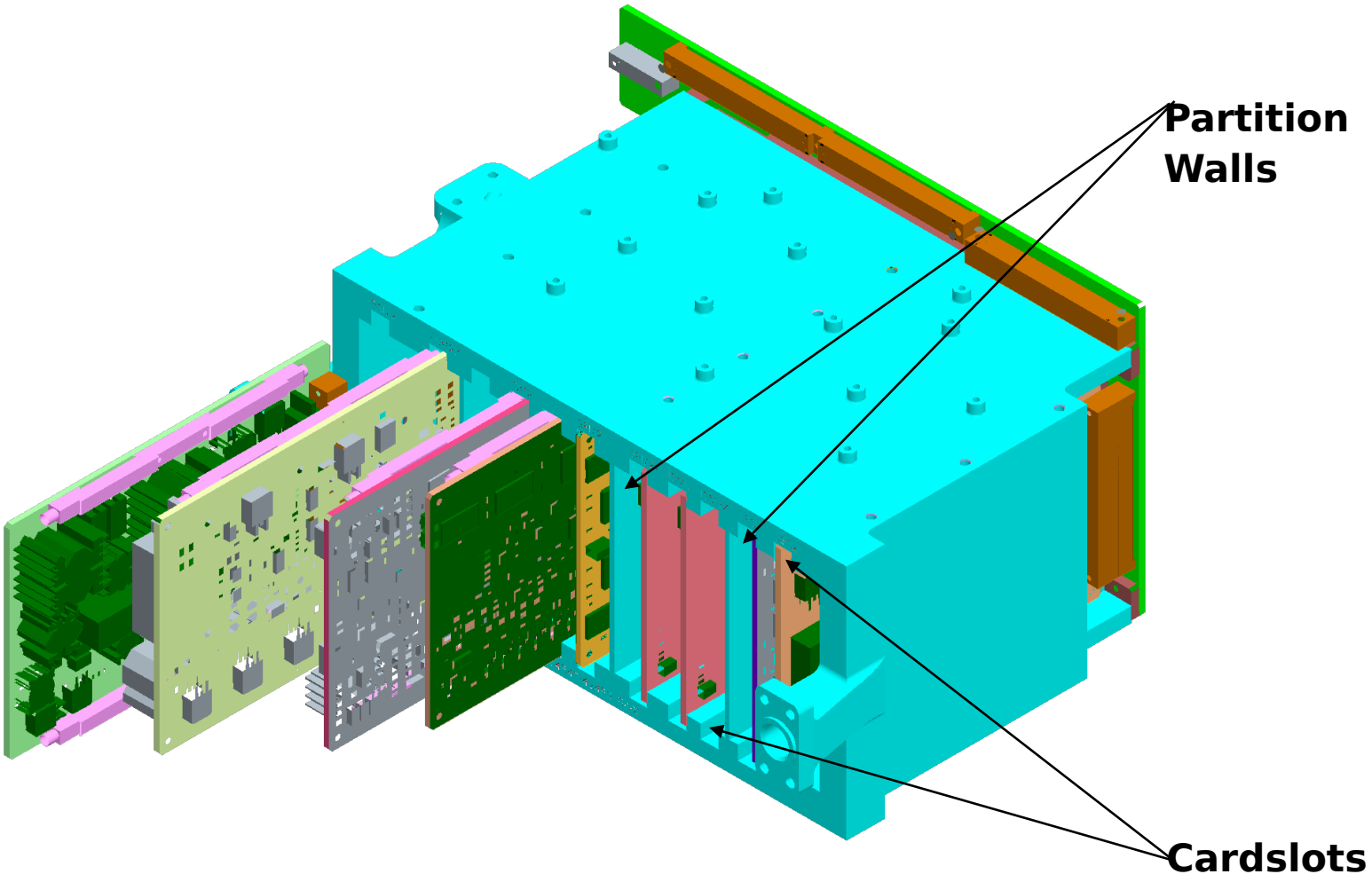


New avionics DEC design

Overview

- Thermal
- Part types
- Life cycle

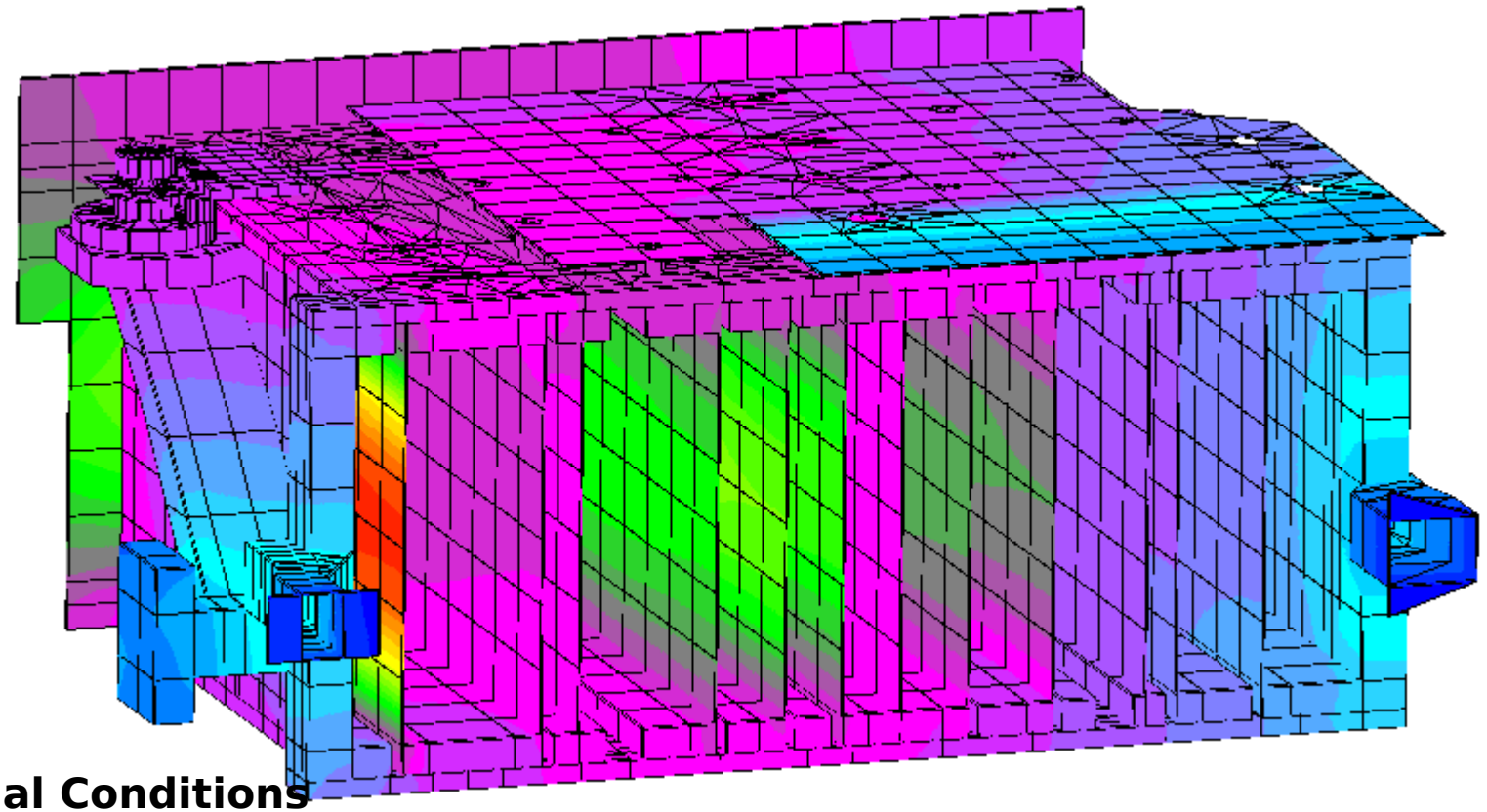
Module Mounting



Thermal Analysis Conditions

- **power (ground operation)**
  - Ambient temperature: 130°F (54°C)
  - Adjacent surface temperature: 130°F (54°C)
  - Fuel temperature: N/A
  - Fuel rate: 0 pph
  - Maximum power dissipation: 43.8 W
- **Maximum normal hot steady state**
  - Ambient temperature: 200°F (93°C)
  - Adjacent surface temperature: 250°F (121°C)
  - Fuel temperature: 170°F (77°C)
  - Fuel rate: 200 pph
  - Maximum power dissipation: 90.7 W
- **Extreme range hot transient**
  - Ambient temperature: 240°F (116°C)
  - Adjacent surface temperature: 310°F (154°C)
  - Fuel temperature: 200°F (93°C)
  - Fuel rate: 200 pph
  - Maximum power dissipation: 90.7 W

Steady State Condition



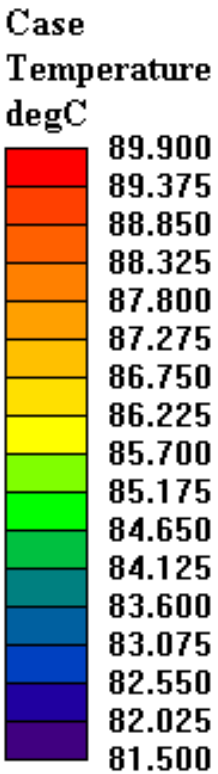
Thermal Conditions

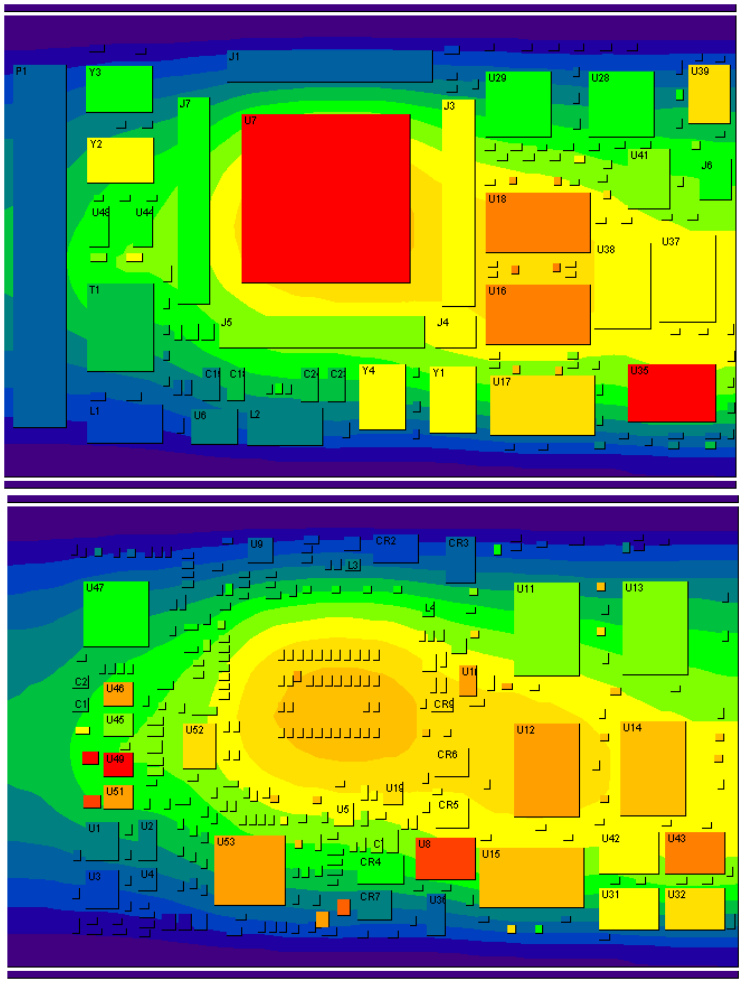
- Ambient Temp: 54°C
- Adjacent surface: 54°C
-

Detail (Under Steady State Boundary Conditions)

Thermal Conditions

- Ambient Temp: 93°C
- Adjacent surface: 121°C
-

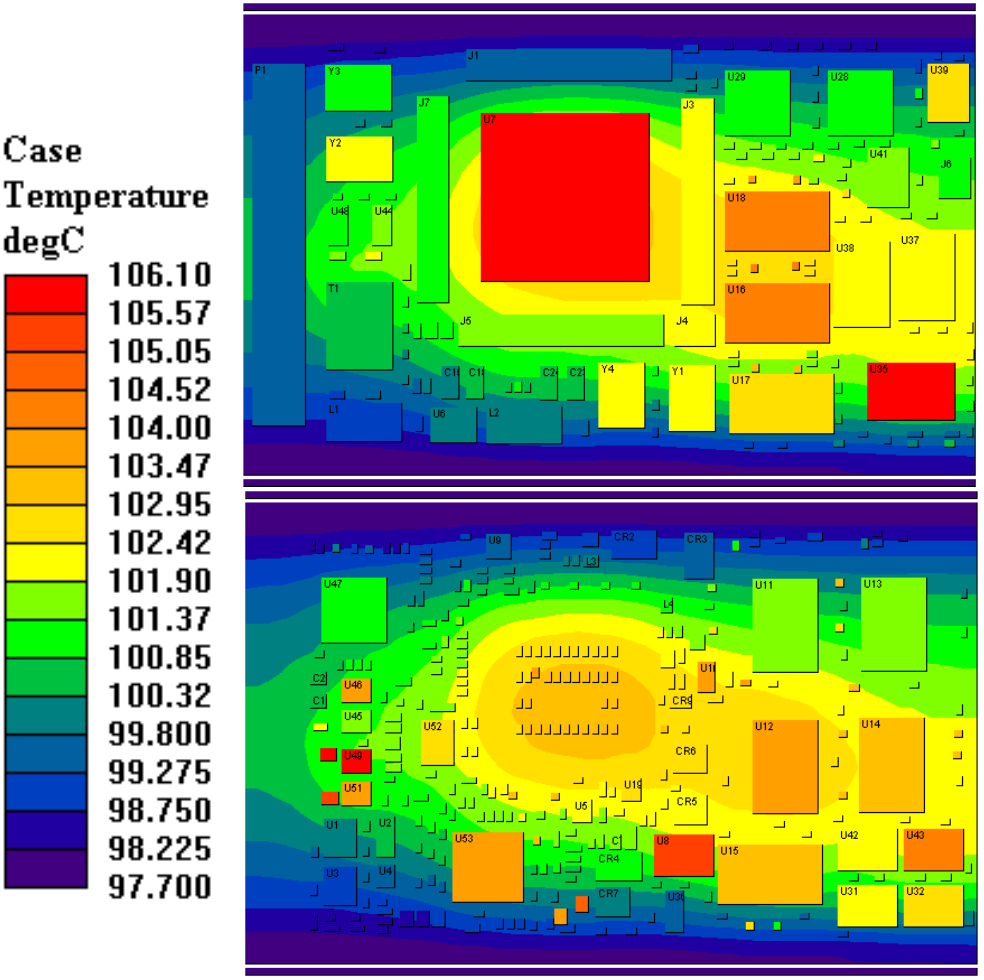




Detail (Under Steady State Boundary Conditions)

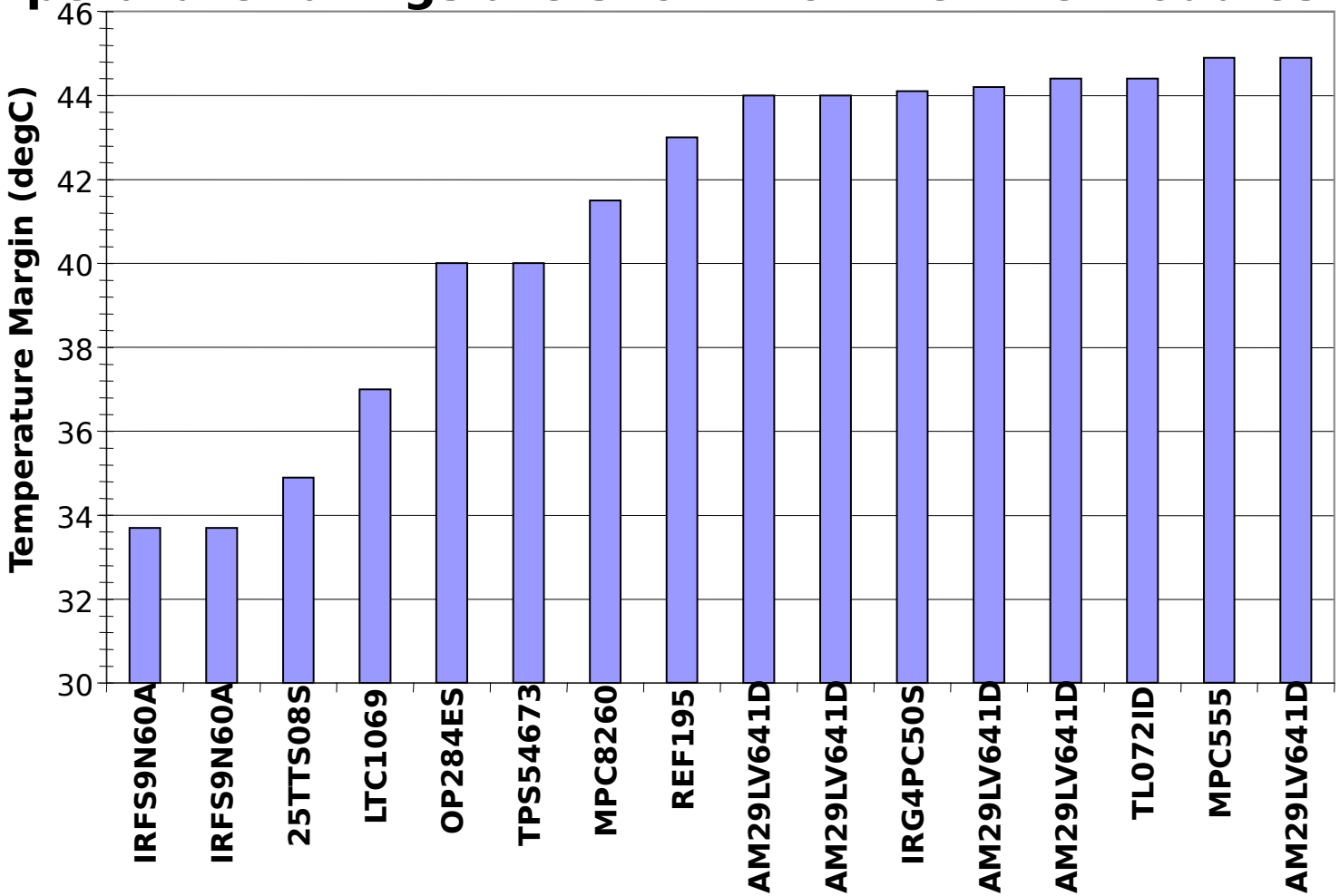
Thermal Conditions

- Ambient Temp: 116°C
- Adjacent surface: 154°C
-



Least Margin Components

- **Active components ranked by temperature margin to their temperature ratings are shown for the DEC modules.**



Thermal Analysis Summary

- **Component margin during maximum normal steady state**
  - **Junction margin at least 34ºC for active components**
  - **Margin at least 25ºC for passive components**
- **Component margin during extreme hot transient**
  - **Junction margin at least 19.5ºC for active components**
  - **Margin at least 10ºC for passive components**
- **Continue to ensure reliable design for hot transient conditions by:**
  - **Ensure no components exceed rated maximum Tj**
  - **Minimize component Tj by design / thermal management, maximize margin**
  - **Limit exposure to 15 occurrences per 1000 hours, during life**

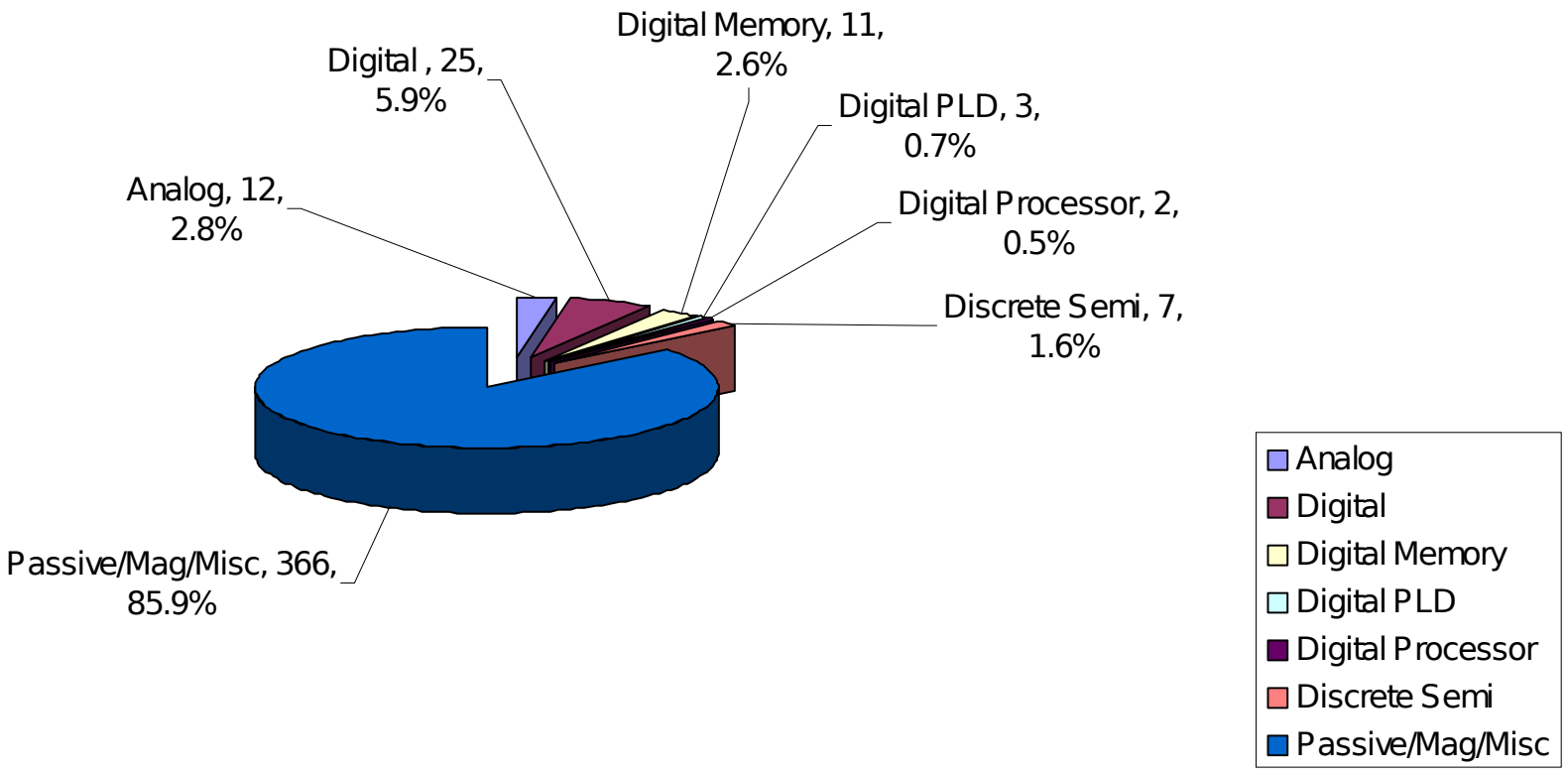
Part breakdown…

-40°C to +85°C	30
-40°C to +105°C	1
-40°C to +125°C	6
-40°C to +130°C	2
-55°C to +85°C	6
-55°C to +125°C	198
-55°C to +150°C	158
-65°C to +125°C	1
-65°C to +150°C	15

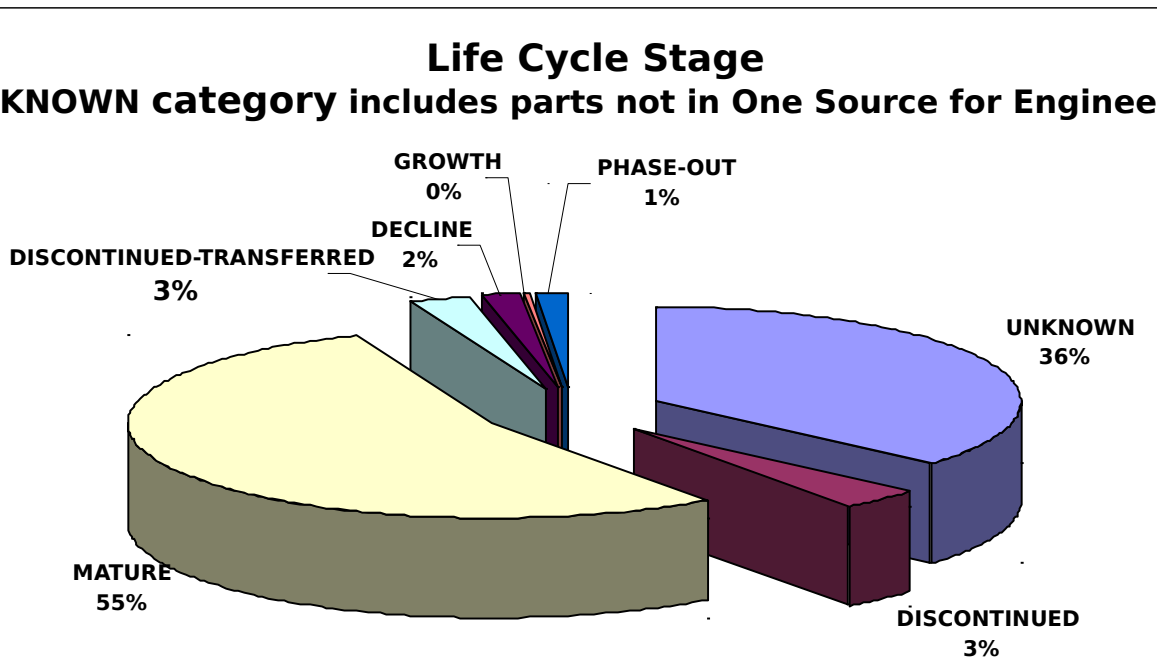
Analog	6
Digital	39
Discrete Semi	10
Magnetics	5
Passive	353
Misc	7

9 devices up-rated

Part types


Electronic Component Types
Digital Memory, 11, 2.6%
Digital , 25, 5.9%
Digital PLD, 3, 0.7%
Analog, 12, 2.8%
Digital Processor, 2, 0.5%
Discrete Semi, 7, 1.6%
Passive/Mag/Misc, 366, 85.9%
Analog
Digital
Digital Memory
Digital PLD
Digital Processor
Discrete Semi
Passive/Mag/Misc

Life cycle…..


Life Cycle Stage
UNKNOWN category includes parts not in One Source for Engineering
GROWTH
0%
PHASE-OUT
1%
DECLINE
2%
DISCONTINUED-TRANSFERRED
3%
UNKNOWN
36%
MATURE
55%
DISCONTINUED
3%

Thanks for your time….

Wrapping -up

Why is ECMP important now?

- **Shorter Lifecycles**
- **Common Processes still not common**
- **Standards old and new…pulling in different directions?**
- **Pressures? Sources of risk and variability… escapes**
  - **Leadfree Transition**
  - **IC wearout**
  - **Radiation**
  - **Counterfit parts**
  - **China**

Perception and Possibilities...ravings of old parts engineer

Military PM

Commercial PM
ECMP

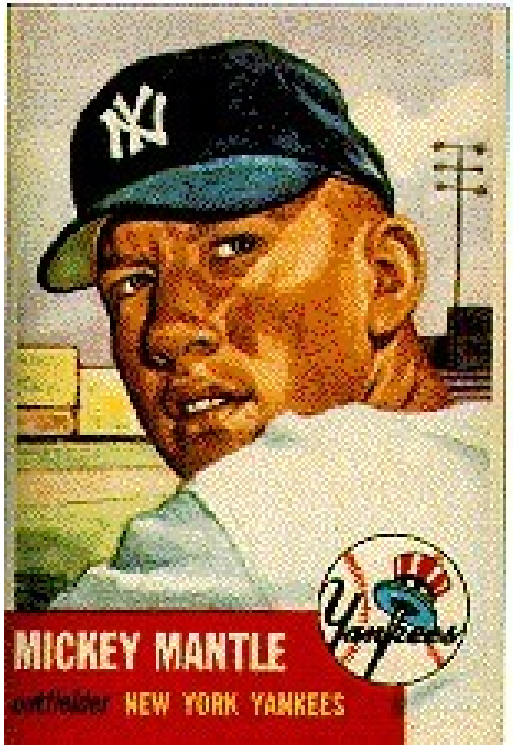
How different are they really

then and **now**

Can ECMP be leveraged? How….$?

Single (common) processes…still possible ?

Where are you ?



“If I knew I was going to live this long, I’d have taken better care of myself.”

Mickey Mantle